

## REMARKS

This Amendment is submitted in response to the Office Action mailed on August 5, 2010. Claims 36 and 38-51 are pending in the application. Claims 38, 40, 42-46, 48-50 and 52-54 are rejected for alleged obviousness reasons, and Claim 54 is rejected under 35 U.S.C. §112. Claims 1-37, 39, 41, 47 and 51 have been cancelled without prejudice or disclaimer. Claim 54 is amended herein. The Commissioner is hereby authorized to charge deposit account 02-1818 for any fees which are due and owing. Applicants respectfully submit that the rejections are improper or have been overcome, as set forth in detail below.

The Office Action rejected Claim 54 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Office Action indicates that the claim recites two different "third substrate" elements. (See, Office Action, pg. 2). This element has been amended to recite "fourth substrate," which is supported by element "support substrate 7" shown in Fig. 6. Accordingly, Applicants respectfully request that the 35 U.S.C. §112, second paragraph rejection of Claim 54 be withdrawn.

In the Office Action, Claims 38, 40, 42-46, 48-50 and 52-54 are rejected under 35 U.S.C. §103(a) as being unpatentable over PCT Publication No. WO 02/084631 as evidenced by U.S. Patent No. 6,872,635 to Hayashi et al. ("Hayashi") in view of U.S. Patent No. 5,426,342 to Nakamura et al. ("Nakamura") and newly cited U.S. Patent No. 4,034,134 to Gregorian et al. ("Gregorian"). Also, Claims 40 and 44-46 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hayashi in view of Nakamura and Gregorian as applied to claims 36, 38-39, 41-43, 45, and 47-51 above, and further in view of U.S. Patent Application Publication No. 2003/0227253 to Seo et al. ("Seo").

Independent Claims 52 and 53 similarly recite, at least in part, a method comprising: (a) arranging a plurality of devices on a temporary adhesion layer of a temporary holding substrate; (b) embedding the plurality of devices into a plurality of positions of an entirely uncured pressure sensitive adhesive layer provided on a transfer substrate by positioning the transfer substrate and the temporary adhesion substrate in close proximity thereof such that the temporary adhesion layer comes into contact with the pressure sensitive adhesive layer, and the plurality of devices become entirely embedded within the pressure sensitive adhesive layer so that the

plurality of devices are substantially flush with the surface of the pressure sensitive adhesive layer, (c) repeating (a) and (b) at least once with a different plurality of devices, wherein for each subsequent embedding step: (i) the entire pressure sensitive adhesive layer remains in an uncured state, and (ii) the different plurality of devices are embedded into different positions of the same pressure sensitive adhesive layer. Claim 54 similarly recited multiple transfer steps while the pressure sensitive adhesive layer remains in an uncured stated.

An image display unit using light emitting devices such as light emitting diodes (“LEDs”) is produced at a low cost by manufacturing a large number of LEDs from a single wafer. (See, Specification, paragraph 5, lines 1-4). Prior art display units are manufactured by rearranging a plurality of devices formed on a device formation substrate onto an apparatus substrate. (See, Specification, paragraph 6, lines 1-4). The devices are first transferred from the device formation substrate to an adhesive layer provided on a temporary holding substrate and then transferred from the temporary holding substrate to the apparatus substrate. (See, Specification, paragraph 6, lines 4-9). In transferring the devices from the temporary holding substrate to the apparatus substrate, an adhesive layer is provided between the temporary holding substrate and the apparatus substrate to adhere the two substrates to each other. (See, Specification, paragraph 7, lines 1-7). Before stripping the two substrates from each other, the adhesive layer is cured while the devices are embedded in it. (See, Specification, paragraph 7, lines 7-16). Due to the strong adhesion between the two substrates, stripping the two substrates from each other may cause damage to the substrates. (See, Specification, paragraph 7, lines 7-13). Furthermore, because the adhesive layer is cured or hardened before stripping, the apparatus substrate is damaged such that it may be difficult to subsequently transfer devices onto the same apparatus substrate. (See, Specification, paragraph 7, lines 14-18).

Therefore, the presently claimed invention provide a method of manufacturing an image display unit by embedding devices arranged on a first substrate into a pressure sensitive adhesive layer provided on a second substrate and stripping the devices from the first substrate before the pressure sensitive adhesive layer is hardened or cured, and where the entire pressure sensitive layer remains uncured for successive device transfer steps. The plurality of devices are arranged on the first substrate by bringing the devices into contact with a temporary adhesion layer provided on the first substrate. (See, Specification, paragraph 12, lines 1-5). The plurality of

devices are collectively embedded within the pressure sensitive adhesive layer by positioning the first and second substrates in close proximity to each other such that the plurality of devices penetrate the surface of the pressure sensitive adhesive layer. (See, Specification, paragraph 10, lines 6-10; Figure 3). Because the devices are embedded within the pressure sensitive adhesive layer rather than merely affixed to its surface, the devices may be mounted onto the second substrate independently of their shapes. (See, Specification, paragraph 10, lines 1-6). Furthermore, by stripping the devices from the first substrate while the entire pressure sensitive adhesive layer is still in an uncured state, the force required to separate the first and second substrates may be further reduced. (See, Specification, paragraph 10, lines 13-19). It is also possible to embed additional devices into the pressure sensitive adhesive layer by embedding the additional devices within the adhesive layer and stripping the additional devices from the substrate on which they are arranged before any portions of the pressure sensitive adhesive layer is cured. (See, Specification, paragraph 11, lines 1-6).

**I. Gregorian combined with Nakamura and Hayashi does not Teach or Suggest the Claimed Invention**

First, the newly cited Gregorian reference fails to cure the deficiencies of Nakamura and Hayashi. In particular, the cited references fail to disclose or suggest every element of the present claims because they fail to disclose or suggest multiple transfers of different devices from a temporary adhesion substrate to be embedded in an uncured pressure sensitive adhesive layer, while keeping the entire pressure sensitive adhesive layer in an uncured state throughout all of the transfer steps, as recited in Claims 52-54.

In this regard, in Fig. 2D of Hayashi, substrate 4 is not brought together with substrate 1 such that adhesive layer portions 5 come into contact with the adhesive layer 2, as claimed. Moreover, the only transfer method in Hayashi that discloses repeated transfer steps specifically requires curing after each step. For instance, with regard to Fig. 2D in Hayashi, Hayashi discloses in col. 11, lines 42-59:

“After the temporarily holding substrate 4 is superimposed to the transfer substrate 6, the adhesive layer 7 is partially irradiated with laser beams L from the back surface side of the transfer substrate 6, to selectively soften the adhesively layer 7, and then the selectively softened adhesive layer 7 is cooled to be thus cured,

whereby the devices 3 are fixed to the adhesive layer 7. For example, as shown in FIG. 3, only a portion, being in contact with the device 3a to be transferred, of the adhesive layer 7 is selectively irradiated with the laser beams L from the back surface side of the transfer substrate 6, to be heated. As a result, only the heated region H of the adhesive layer 7 made from a thermoplastic adhesive resin is softened, to exhibit an adhesive force against the device 3a. The irradiation of the laser beams is then stopped, and the heated region H is cooled to be cured, to fix the device 3a to the transfer substrate 6 via the adhesive layer."

With regard to the Nakamura reference, the Office Action merely relies on Nakamura for the alleged disclosure of a "heat sensitive and pressure sensitive adhesive layer." There is no disclosure or suggestion in Nakamura for repeated device transfer steps into a pressure sensitive adhesive layer while maintaining the entire pressure sensitive adhesive layer in an uncured state. Thus, Nakamura fails to cure the deficiencies of Hayashi, even assuming the references are properly combinable.

As mentioned above, Hayashi and Nakamura are deficient with regard to the claimed feature of repeated device transfer steps into a pressure sensitive adhesive layer while maintaining the entire pressure sensitive adhesive layer in an uncured state. There is no disclosure or suggestion in Gregorian of keeping the adhesive 14 in an uncured state throughout one or more subsequent "device" transfer steps. Rather, as discussed in further detail below, Gregorian is related to a very different field of endeavor than the primary Hayashi reference. Whereas Hayashi is related to transferring micro-sized red, green and blue light emitting diodes ("LEDs"), Gregorian is related to forming fabrics or textile laminates. The process in Gregorian is accomplished with a single transfer of a facing layer 18, a flocking material 16, and spray adhesive "applied to the very surface tips of the flock fibers 16" from a release sheet 20 to a substrate backing layer 12. (See, Gregorian, Fig. 2; col. 1, line 64 to col. 2, line 24; col. 5, lines 13-21; col. 6, lines 15-17 and 41-54).

Multiple transfer steps to the same substrate backing 12 layer would not be possible based on the disclosure in Gregorian because: (a) the flocking material 16 is applied to cover the entire film forming material 8 (i.e., cured to be facing layer 18), and the facing layer 18 covers the entire release sheet 20; (b) flocking material 16 which is tip-coated with the adhesive 14 spray is directly applied to the substrate backing layer 12; and (c) only the release sheet 20 is

removed (i.e., the facing layer 18 is not removed). Therefore, because the facing layer 18 is not removed, it would be an obstacle to any further attempts to transfer flocking material 16 and adhesive 14 directly to the substrate backing layer 12. That is, in any subsequent attempt to transfer flocking material, it would be applied to the previously applied facing layer 18 (which would be the un-removed exterior layer), rather than reapplied to the substrate backing layer 12. Moreover, because the flocking box 34 (as shown in Fig. 1) coats the entire film forming material layer 8 with flock 16, there would not be a need for a subsequent transfer operation, as the fibrous textile product has already been completely formed. As such, it is clear that the process disclosed in Gregorian is limited to a single transfer operation.

The Examiner relies on Gregorian for the disclosure of “peeling the donor substrate prior to curing.” (See, Office Action, pg. 7). However, even assuming that the release layer 20 can be considered as a donor substrate (notwithstanding the fact that facing layer 18 is not removed), this does not cure the deficiencies of Hayashi and Nakamura because there is no disclosure or suggestion in Gregorian regarding repeated device transfer steps into a pressure sensitive adhesive layer while maintaining the entire pressure sensitive adhesive layer in an uncured state, as required by the presently claimed invention. Moreover, similar to Hayashi, Gregorian discloses curing the adhesive after the first (and only) transfer step regardless of whether or not the release layer 20 is removed before or after curing the adhesive.

Accordingly, Gregorian fails to cure the deficiencies of Nakamura and Hayashi as discussed above, even assuming that all of the references are properly combinable.

## **II. Gregorian is Nonanalogous Art to the Presently Claimed Invention**

The examiner must determine what is “analogous prior art” for the purpose of analyzing the obviousness of the subject matter at issue. (See, MPEP, §2141.01(a)). Applicant respectfully disagrees and submits that Gregorian is non-analogous prior art and was improperly combined with Hayashi to form the basis of the rejection. Specifically, Gregorian is non-analogous prior art under MPEP §2141.01(a) and under the Federal Circuit’s two part test for determining whether prior art is non-analogous as set forth in In re Clay, 966 F. 2d 656, 568 (Fed. Cir. 1992). The first part of this test is to determine whether the alleged prior art and the claimed invention reside in the same field of endeavor, regardless of the problem that the claimed invention

attempts to solve. If the alleged prior art does not fall within the same field of endeavor, the next question is whether the prior art is "reasonably pertinent" to the specific problem that the claimed invention seeks to solve.

Regarding the first part of this test, the claimed invention pertains to a device transfer method comprising: (a) arranging a plurality of devices on a temporary adhesion layer of a temporary holding substrate; (b) embedding the plurality of devices into a plurality of positions of an entirely uncured pressure sensitive adhesive layer provided on a transfer substrate by positioning the transfer substrate and the temporary adhesion substrate in close proximity thereof such that the temporary adhesion layer comes into contact with the pressure sensitive adhesive layer, and the plurality of devices become entirely embedded within the pressure sensitive adhesive layer so that the plurality of devices are substantially flush with the surface of the pressure sensitive adhesive layer, (c) repeating (a) and (b) at least once with a different plurality of devices, wherein for each subsequent embedding step: (i) the entire pressure sensitive adhesive layer remains in an uncured state, and (ii) the different plurality of devices are embedded into different positions of the same pressure sensitive adhesive layer. Thus, the field of endeavor of the claimed invention is selectively transferring light emitting devices from one substrate to another while maintaining the devices in an uncured state through repeated transfer steps. On the other hand, Gregorian pertains to related to forming fabrics or textile laminates. Accordingly, as Gregorian falls within the fabrics or textiles field of endeavor and the claimed invention pertains to selectively transferring light emitting devices from one substrate to another, Gregorian and the claimed invention clearly do not reside in the same field of endeavor under MPEP §2141.01(a).

In the second part of the non-analogous art test, it is necessary to examine whether the reference is still reasonably pertinent to the particular problem with which the inventor is involved. A reference in a field different from that of applicant's endeavor may be reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his or her invention as a whole. (See, *Id.*). Moreover, it is necessary to determine whether an inventor would reasonably be motivated to go to the field in which the examiner found the reference, in order to solve the problem confronting the inventor. In re Oetiker, 977 F. 2d 1443, 1447 (Fed. Cir. 1992).

Applicants respectfully submit that Gregorian is not reasonably pertinent to the specific problem the present invention seeks to solve. The presently claimed invention addresses at least the problem of not being able to repeatedly transfer LEDs from one substrate to another, since in prior art methods (i.e., such as the primary Hayashi reference) the adhesive layer is hardened (cured) in the condition where the devices are embedded in the adhesive layer it is difficult to transfer the devices onto the apparatus substrate and thereafter again transfer devices onto the same apparatus substrate. (See, Specification, pg. 4, lines 21-24). In contrast, Gregorian provides a system to manufacture a laminated textile product by applying flocking fibers to a cured film forming layer (facing layer 18), and then adhering same to a substrate backing layer 12 without removing the facing layer 18 (thus preventing any possible repeated transfer steps of flocking material). As such, one of ordinary skill in the art would not logically look to Gregorian in trying to solve the above-described problem addressed in the present application. Accordingly, because Gregorian is not reasonably pertinent to the specific problem the present invention seeks to solve.

Also, while the Patent Office classification of references and the cross-references in the official search notes of the class definitions are some evidence of “nonanalogy” or “analogy” respectively, the court has found “the similarities and differences in structure and function of the inventions to carry far greater weight.” (See, MPEP, §2141.01(a) and In re Ellis, 476 F.2d 1370, 1372, 177 USPQ 526, 527 (CCPA 1973)). However, there are no similarities in structure or function between the presently claimed invention and Gregorian. For example, the function of the presently claimed invention is selectively transferring light emitting devices from one substrate to another while maintaining the devices in an uncured state through repeated transfer steps, whereas the function of Gregorian, at best, allows for single step of adhering fibrous or flock material to a substrate backing layer to form a textile product. Moreover, similar to Hayashi, Gregorian discloses curing the adhesive after the first transfer step regardless of whether or not the release layer 20 is removed before or after the adhesive is cured. Nor are the structures of the presently claimed invention and Gregorian similar. As mentioned above, the structure of the presently claimed invention is a display apparatus having an array of embedded light emitting devices, whereas Gregorian relates to fabrics.

Accordingly, because Gregorian and the presently claimed invention are non-analogous art, the Patent Office has improperly relied on Gregorian in the 35 U.S.C. §103 rejection of Claims 38, 40, 42-46, 48-50 and 52-54.

### **III. The Combination of Hayashi and Gregorian Destroys the Intended Purpose of Hayashi Which Renders the Combination of Hayashi and Gregorian Improper**

As mentioned above, the only transfer method in Hayashi that discloses repeated transfer steps specifically requires curing after each step. With regard to Fig. 2D in Hayashi, Hayashi discloses in col. 11, lines 42-59: "After the temporarily holding substrate 4 is superimposed to the transfer substrate 6, the adhesive layer 7 is partially irradiated with laser beams L from the back surface side of the transfer substrate 6, to selectively soften the adhesively layer 7, and then the selectively softened adhesive layer 7 is cooled to be thus cured, whereby the devices 3 are fixed to the adhesive layer 7 ... [f]or example, as shown in FIG. 3, only a portion, being in contact with the device 3a to be transferred, of the adhesive layer 7 is selectively irradiated with the laser beams L from the back surface side of the transfer substrate 6, to be heated. As a result, only the heated region H of the adhesive layer 7 made from a thermoplastic adhesive resin is softened, to exhibit an adhesive force against the device 3a ... [t]he irradiation of the laser beams is then stopped, and the heated region H is cooled to be cured, to fix the device 3a to the transfer substrate 6 via the adhesive layer."

Thus, the intended purpose of Hayashi is clearly to immobilize the transferred devices after each step to avoid movement or shifting of same in any subsequent transfer operations. Accordingly, the modification proposed to Hayashi in the Office Action (i.e., not curing the adhesive on the donee substrate) would render Hayashi unsatisfactory for its intended purpose and change the principle of operation of same, and is in direct contradiction to the teachings of Hayashi. Thus, there is no motivation to combine Hayashi in this manner, and such rejections involving the modified Hayashi method are fundamentally flawed.

### **IV. The Examiner is Using the Pending Claims as a Blueprint for Improperly Piecing Together Prior Art References**



Applicants submit the Examiner is improperly working backwards from the claimed invention and piecing together elements from different references to form the claimed invention. Obviousness cannot be based on the hindsight combination of components selectively culled from prior art to fit the parameters of the claimed invention. In this case, it would not have been obvious to one of ordinary skill in the art at the time of the invention to combine Hayashi and Gregorian to result in the device transfer method without reasonably being construed as improper hindsight reconstruction, based at least on the reasons discussed above. Only with the benefit of hindsight reasoning is the Examiner picking and choosing different elements from Hayashi, Nakamura and Gregorian to recreate the claimed invention and form the basis of these rejections. Such reasoning is improper, and thus these rejections are also improper.

Accordingly, Applicants respectfully request that the rejection of Claims 36, 38-39, 41-43, 45 and 47-51 under 35 U.S.C. §103(a) to Hayashi, Nakamura and Gregorian be withdrawn.

In the Office Action, Claims 40 and 44-46 are rejected under 35 U.S.C. §103(a) as being unpatentable over WO 02/084631 A1 to Hayashi et al. as evidenced by Hayashi in view of Nakamura, and further in view of U.S. Patent Application No. 2003/0227253 to Seo et al. ("Seo") and Gregorian. As discussed previously, Hayashi, Nakamura and Gregorian fail to disclose or suggest (a) arranging a plurality of devices on a temporary adhesion layer of a temporary holding substrate; (b) embedding the plurality of devices into a plurality of positions of an entirely uncured pressure sensitive adhesive layer provided on a transfer substrate by positioning the transfer substrate and the temporary adhesion substrate in close proximity thereof such that the temporary adhesion layer comes into contact with the pressure sensitive adhesive layer, and the plurality of devices become entirely embedded within the pressure sensitive adhesive layer so that the plurality of devices are substantially flush with the surface of the pressure sensitive adhesive layer, (c) repeating (a) and (b) at least once with a different plurality of devices, wherein for each subsequent embedding step: (i) the entire pressure sensitive adhesive layer remains in an uncured state, and (ii) the different plurality of devices are embedded into different positions of the same pressure sensitive adhesive layer as required, in part, by independent Claims 52 to 54, from which Claims 40 and 44-46 depend. The Examiner further relies on Seo merely for the disclosure of driving methods that include impressing a voltage on the devices through the first and second electric wirings. (See, Office Action, page

14). Thus, Applicants respectfully submit that Seo fails to remedy the deficiencies of Hayashi, Gregorian and Nakamura.

Accordingly, Applicants respectfully request that the rejection of Claims 40 and 44-46 under 35 U.S.C. §103(a) to Hayashi, Nakamura, Seo and Gregorian be reconsidered and withdrawn.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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